

### REMARKS

This paper is responsive to an Office Action dated January 23, 2006. Prior to this amendment claims 1-9 were pending. After amending claim 9 and adding claim 12, claims 1-9 and 12 remain pending.

In Section 1 of the Office Action claim 9 has been rejected under 35 U.S.C. 112, second paragraph, as indefinite. In response, the claim has been amended to recite "gate structure" instead of "method".

In Section 3 of the Office Action claim 1 has been rejected under 35 U.S.C. 102(b) as anticipated by Saito et al. ("Saito"). The Office Action states that Saito describes NbO as a gate overlying a gate dielectric, citing paragraphs [0011], [0020], and [0027]. This rejection is traversed as follows.

"A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." *Verdegaal Bros. v. Union Oil of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987).

Generally, the Saito application is poorly translated. It is difficult to understand the Saito invention, as many passages make little sense, and other passages appear contradictory. An anticipation rejection requires that the prior art explicitly describe all the limitations of the claimed invention, but the Applicant respectfully submits that since the Saito reference is largely unintelligible, that it be removed as a reference.

Saito's paragraph [0011] appears to say that Nb<sub>2</sub>O<sub>5</sub> can be used as the ion inductor of a hydrogen-ion sensing element. The

paragraph also appears to say that the hydrogen ion electrode can be combination of a niobium oxide film with a reference electrode. The Applicant is not entirely sure of the meaning of this paragraph. However, it seems apparent that Saito is describing Nb<sub>2</sub>O<sub>5</sub>, as the term "niobium monoxide" is never mentioned. Further, it is clear that the paragraph never explicitly describes niobium oxide (in any form) as a transistor gate.

Saito's paragraph [0020] initially describes forming Nb<sub>2</sub>O<sub>5</sub> on a gate dielectric film. Later, the paragraph states that Nb<sub>2</sub>O<sub>5</sub> is formed *on* the gate. Again, this paragraph fails to describe niobium monoxide, or niobium oxide (in any form) as transistor gate.

Saito's paragraph [0027] states that NbO can be used as an alternate material to Nb<sub>2</sub>O<sub>5</sub> in the "example". However, it is not clear as to which example the application refers. Further, the paragraph never states that NbO can be used as a transistor gate.

The Applicant understands Saito to describe a niobium oxide layer formed overlying a conductive gate electrode. The niobium oxide layer acts as a hydrogen ion sensor. Saito appears to describe this combination of elements as a "hydrogen ion electrode" [0022]. The Office Action states that since NbO is used to induct hydrogen ions, that it is considered as a gate. However, the Applicant respectfully submits that it is incorrect to refer to the niobium oxide part of the "hydrogen ion electrode" combination as a gate electrode. Saito appears to differentiate between the gate and hydrogen ion sensor components. As is well known in the art, the pn junction of a transistor is responsive to a field generated by the gate. Such a field is created by a conductive material, which is referred to as the gate. As

further proof, in paragraph [0027] Saito emphatically maintains that NbO is just as effective a material as Nb<sub>2</sub>O<sub>5</sub>. However, since Nb<sub>2</sub>O<sub>5</sub> is an insulator, and cannot be effective as a gate, Saito's niobium oxide must necessarily have some other function. That is, Saito's niobium oxide (in whatever stoichiometry) is not used as a conductive gate.

Applicant's claim 1 recites the element of a niobium monoxide transistor gate. Saito may describe a device that uses niobium oxide overlying a gate, or a hydrogen ion electrode combination of elements. However, he does not explicitly describe a niobium monoxide gate. Since Saito does not explicitly describe all the limitations of claim 1, the Applicant respectfully requests that the rejection be removed.

In Section 5 of the Office Action claim 2 has been rejected under 35 U.S.C. 103(a) as unpatentable with respect to Saito. The Office Action acknowledges that Saito does not show the claimed work function, but that the recited work function would have been obvious to one with skill in the art. This rejection is traversed as follows.

An invention is unpatentable if the differences between it and the prior art would have been obvious at the time of the invention. As stated in MPEP § 2143, there are three requirements to establish a *prima facie* case of obviousness.

First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the

claimed combination and reasonable expectation of success must both be found in the prior art and not based on applicant's disclosure. *In re Vaack* 947 F.2d 488, 20 USPQ2d, 1438 (Fed. Cir. 1991).

As noted above in response to the anticipation rejection, Saito does not explicitly describe a niobium monoxide gate. With respect to the first *prima facie* requirement to prove a case of obvious, neither is there a suggestion that the Saito be modified to make this limitation obvious. In fact, Saito can be said to point away from the niobium monoxide gate limitation. As noted above, Saito states that Nb<sub>2</sub>O<sub>5</sub> is just as effective a material as NbO. However, since an insulator (Nb<sub>2</sub>O<sub>5</sub>) cannot possible act as a transistor gate, the clear implication is that Saito is using niobium oxide for some function other than a transistor gate. With respect to the second *prima facie* reference, an expert given the Saito reference as a foundation would be unlikely to consider niobium oxide as an effective gate material, for the reasons expressed above.

With respect to the third *prima facie* requirement, the Saito reference does not explicitly teach that niobium monoxide can be used as a transistor gate, as recited in claim 1. Neither is there any suggestion that Saito be modified in a manner that would make this missing limitation obvious. Claim 2, dependent from claim 1, enjoys the same distinctions from the cited prior art reference, and the Applicant requests that the rejection be removed.

In Section 6 of the Office Action claims 3, 6, and 7 have been rejected under 35 U.S.C. 103(a) as unpatentable with respect to Saito, in view of Esashi. The Office Action acknowledges that Saito does not disclose a silicon dioxide gate dielectric or a capping layer.

The Office Action states that Esashi describes a silicon dioxide gate dielectric and capping layer, and that it would have been obvious to use these elements in the Saito device, as they are widely-known elements. This rejection is further traversed as follows.

With respect to the first and second *prima facie* requirements, even if it would have been obvious to use a silicon dioxide gate dielectric or capping layer in the Saito device, the Esashi reference does not suggest modifications to Saito that would make all the limitations of claim 1 obvious. That is, Esashi does not suggest that Saito be modified to use NbO as a transistor gate material.

Considered from the perspective of the third *prima facie* requirement, even if Saito and Esashi are combined they do not explicitly describe a NbO gate. Neither does the combination suggest any modifications to Saito that would make the missing limitation obvious. Claims 3, 6, and 7, dependent from claim 1, enjoy the same distinctions from the cited prior art, and the Applicant respectfully requests that the rejection be removed.

In Section 7 of the Office Action claim 4 has been rejected under 35 U.S.C. 103(a) as unpatentable with respect to Saito, in view of Suzuki. The Office Action acknowledges that Saito does not disclose a high-k gate dielectric. The Office Action states that Suzuki describes a high-k gate dielectric, and that it would have been obvious to use a high-k dielectric in the Saito device, as it increases sensitivity. This rejection is traversed as follows.

With respect to the first and second *prima facie* requirements, even if it would have been obvious to use a high-k gate dielectric in the Saito device, the Suzuki reference does not suggest

modifications to Saito that would make all the limitations of claim 1 obvious. That is, Suzuki does not suggest that Saito be modified to use NbO as a transistor gate material.

Considered from the perspective of the third *prima facie* requirement, even if Saito and Suzuki are combined they do not explicitly describe a NbO gate. Neither does the combination suggest any modifications to Saito that would make the missing limitation obvious. Claim 4, dependent from claim 1, enjoys the same distinctions from the cited prior art, and the Applicant respectfully requests that the rejection be removed.

In Section 8 of the Office Action claim 5 has been rejected under 35 U.S.C. 103(a) as unpatentable with respect to Saito, in view of Suzuki and Ma. The Office Action acknowledges that Saito does not disclose the recited high-k gate dielectric materials. The Office Action states that Ma describes one of the recited high-k gate dielectrics, and that it would have been obvious to use the disclosed high-k dielectric in the Saito device, as it is widely used. This rejection is traversed as follows.

With respect to the first and second *prima facie* requirements, even if it would have been obvious to use the disclosed high-k gate dielectric in the Saito device, neither the Suzuki nor Ma references suggest modifications to Saito that would make all the limitations of claim 1 obvious. That is, neither Ma nor Suzuki suggests that Saito be modified to use NbO as a transistor gate material.

Considered from the perspective of the third *prima facie* requirement, even if Saito, Ma, and Suzuki are combined they do not

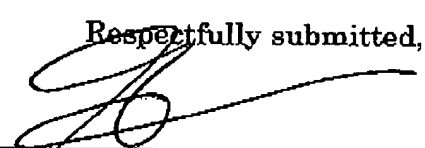
explicitly describe a NbO gate. Neither does the combination suggest any modifications to Saito that would make the missing limitation obvious. Claim 5, dependent from claim 1, enjoys the same distinctions from the cited prior art, and the Applicant respectfully requests that the rejection be removed.

Section 9 of the Office Action states that claim 8 would be found allowable if rewritten in independent form, including all the subject matter of the base and intervening claims. In response, claim 12 has been added. Claim 12 includes the subject matter of claims 1, 6, and 8.

It is believed that the application is in condition for allowance and reconsideration is earnestly solicited.

Respectfully submitted,

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